DOCUMENT RESUME

ED 276 041 CS 210 147

AUTHOR Stevenson, Zollie, Jr.
TITLE The Relationship of North Carolina Writing Assessment Scores to Achievement on the Language and Reading Subtests of the California Achievement Test. A Research Study.
PUB DATE [85]
NOTE 31p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Achievement Tests; Elementary Secondary Education; Language Skills; *Language Tests; Reading Skills; *Reading Tests; Standardized Tests; *Test Interpretation; Test Results; *Test Theory; Writing Evaluation; Writing Research; Writing Skills
IDENTIFIERS *California Achievement Tests; *North Carolina Annual Testing Program

ABSTRACT

A study examined the correlations and predictive relationships between reading and language achievement test scores and North Carolina Annual Writing Assessment scores. Subjects, over 1,000 sixth and ninth grade students, were administered both the North Carolina Annual Writing Assessment and the California Achievement Test (CAT) in 1984 and 1985. Results provided interesting information relative to patterns of performance and their relationship to both the prediction equation and the predictors of writing achievement. The results of the writing assessment in 1984 were more positive for sixth graders than for ninth grade students; the reverse took place in 1985. Findings supported the notion that the best predictors of scores on the North Carolina Annual Writing Assessment using the CAT are the Reading Total and Language Total subtests. The low to moderate correlations between the North Carolina Annual Writing Assessment and the CAT evidenced the need for a separate measure of writing. The data also indicated that the predictors of writing performance using a standardized achievement measure varied depending on the difficulty of the composing domain assessed, student preparation, and the resulting distribution of scores. (Extensive tables of statistical data are included.) (JD)

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The Relationship of North Carolina Writing Assessment Scores to Achievement on the Language and Reading Subtests of the California Achievement Test

A Research Study
Submitted By

Zollie Stevenson, Jr., Ph. D.
Research and Evaluation Coord.
Central Regional Education Center

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INTRODUCTION

The "Excellence in Education" movement has brought about a pendulum swing that has returned the emphasis in public schools to teaching basic skills: Reading, Writing and Arithmetic. State Department of Public Instruction personnel in North Carolina have retooled grade level and subject matter curricula and expanded evaluation instruments to include science, social studies and writing. The North Carolina Annual Writing Assessment is the instrument that will be considered in this study.

Writing assessments or tests are not new phenomena. The Educational Testing Service developed writing tests during the 1930's. Use of writing tests wanned during World War II but resurfaced during the 1960's in various forms. Writing tests during the 60's analyzed correct letter formation (i.e., the students ability to write a paragraph using "standardized" cursive writing) and elements of a good paragraph (introduction, body, summary and conclusion). Little attention was directed to the content of a passage. The reliability and validity of writing tests were unimpressive. The 1980's brought about renewed interest in writing assessment due in part to advances in the ability to objectify writing assessment and, in large measure, due to advances in statistical procedures and computer technology which facilitated improved scorability, reliability and validity data.

The North Carolina Writing Assessment uses a modification of the holistic approach to assess writing called the "focused holistic method." The focused holistic method emphasizes the readers general impression of a composition's quality using a set of prescribed composition characteristics and a set of possible scores that could be achieved based on the writing facility of the student as demonstrated in the composition. Writing domains assessed at grades 6 and 9 in North Carolina have been limited to two domains: Grade 6, Descriptive and Clarification and Grade 9, Point-of-View and Persuasive.

THE PROBLEM

Statement of the Problem. The purpose of this study was to determine the predictive relationship between reading and language achievement test scores and North Carolina Writing Assessment scores. This study involved a sample of over 1,000 students at each grade (6 and 9) who were administered both the Annual Writing Assessment and the California Achievement Test in 1984 and 1985. Data for the approximately 4,000 students were randomly selected for inclusion in this study. Table 1 indicates the number of students involved in this study at each grade level.

Importance of the Problem

This research was important in that it:

1. Established the correlation between the annual writing assessment and an objective test of language and reading administered to North Carolina students.
2. Provided data on the predictive ability of objective indicators and the North Carolina Writing Assessment.
3. Stimulated additional thought as to what the North Carolina Writing Assessment measures and the implications of writing assessment in North Carolina.

Additionally, this research is important in that it uses a randomly selected data base of students from across North Carolina to examine a topic that has not been widely studied. The results of this study should be considered in conducting larger scale investigations before generalizing the results to the total population of 6th and 9th grade students.

Information gathered and presented in this study can be used in educational planning and can assist writing assessment developers in improving writing tests. Finally, the results of this study will provide us with a frame of reference on which to anchor our understanding of the assessment of writing to standardized measures of achievement.

Specific Objectives of this Study

1. To determine the correlations between achievement on reading and language tests and scores on the North Carolina Writing Assessment.
2. To determine the predictive relationship between reading and language tests and scores on the North Carolina Writing Assessment.

Delimitations of the Study

Originally, the assessment of writing in North Carolina was designed to measure writing samples of 6th and 9th grade students. Recently, the grade level at which assessment should occur in the North Carolina Annual Testing Program was changed from 9th grade to 8th grade. Therefore, the implications of the data generated in this study for grade 9 might not be generalizable to grade 8 students taking the same writing samples or objective tests.

Also, student data were randomly selected using telephone numbers initially to match up 6th and 9th grade students who took the Writing Assessments and those who took the California Achievement Test. Therefore, this study might not be representative of students from impoverished environments where telephones do not exist or where the number that a student should put on a student information questionnaire could vary from one test administration to another.

Finally, this study does not endeavor to make a statement about socio-economic factors, race, maturity, bias or gender differences in the performance of students taking these tests or the impact of those factors as predictors of achievement. Thus, this investigation endeavors to glean a point of departure for additional investigations which could include factors such as those noted above.

LITERATURE REVIEW

The relationship between objective measures of achievement in reading and language with evaluations of student writing has been extensively cited in the literature prior to the 1970's (e.g., Godshalk, Swineford and Coffman, 1966). The Godshalk, et. al. monograph (1966) analyzed decades of research relative to the nature of writing assessment and objective predictors of writing performance. Among their findings

were that student compositions correlated positively with objective measures of writing and measures of verbal ability (see Huddleston, 1954) and that student essays contributed uniquely to the prediction of freshman English grades (above and beyond the contribution of objective and semi-objective English composition questions) (Pearson, 1955). Aulls (1975) found that a positive relationship existed between evaluations of student writing samples and objective measures of reading comprehension. Bertrand (1983) learned that student writing samples correlated with both the Total Reading and Total Language tests of the Metropolitan Achievement Test (.56 and .61 respectively). Olson and Martin (1984) studied the impact of using student essays and an objective reading measure on student placement at the community college level. Their results indicated that 39% of the students received the same recommendation to take remedial English based on essay or reading test scores and that the reading test was the best predictor of English grades.

PROCEDURE

The North Carolina Writing Assessment was administered to 6th and 9th grade students in a field test during January 1984. The second administration of the North Carolina Writing Assessment occurred in December 1984. Four writing domains or composition styles have been approved by the State Board of Education for use in assessing students. Point-of-View and Persuasive composing domains have been approved for test development at Grade 9. Description and clarification composing domains have been approved at Grade 6. During January 1984, the composing domain on the writing assessment was persuasive for 9th grade students - Descriptive for 6th grade students. In December 1984, the composing domain for 9th grade students was Point-of-View - Clarification for 6th grade students.

Data were collected from the January and December, 1984 writing assessments and the March 1984 and April 1985 administrations of the California Achievement Test, Levels 16-C and 18-C for inclusion in this study. The data was collected using a stratified random approach from one thousand students across the state at each grade level during the January and December administrations of the writing test. In essence,

the data for 2,000 ninth graders was collected (1,000 in January and 1,000 in December) as was the data for 2,000 sixth grade students.

Data collected included race, sex, objective test scores on the CAT for Language Expression, Language Mechanics, Language Total, Reading Vocabulary, Reading Comprehension and Reading Total and composing domain scores on the North Carolina Annual Writing Assessment. The data were analyzed using the Stepwise Multiple Regression Maximum Improvement component (MAXR) of the Statistical Analysis Systems (SAS) computer program. The outstanding feature of MAXR is that the model of best fit is generated so that the best one variable, two variable models, etc. (the models with the greatest prediction) are selected by the computer. MAXR also produced an intercorrelation matrix yielding information on the relationship of all variables in the models.

The criterion for this study was the composing domain score on the North Carolina Annual Writing Assessment. The predictors were objective measures of Language and Reading from the CAT. The alpha level for this study was set at .05.

RESULTS

This section reports on the statistical relationship between the criterion (the composing domain score from the Annual Writing Assessment at grades 6 and 9) and the predictors (CAT Reading Total, Language Total, Reading Vocabulary, Reading Comprehension, Language Mechanics and Language Expression) during 1984 and 1985. Tables 1 and 2 yield data on the number of students tested and the average scores of students on the CAT subtests and the Annual Writing Assessment by sex.

Correlation coefficients are provided for students involved in the study by gender during 1984 and 1985 (Tables 3, 4, 5 and 6). Tables 7 and 8 list the multiple correlation coefficients between writing assessment scores and the CAT subtests. Tables 9 and 10 summarize the regression analyses for Grades 6 and 9. Tables 11 and 12 lists the writing domain scores for each grade level and their corresponding mean CAT scale scores.

TABLE 1

Summary of Descriptive Data for Ninth Grade Students Involved in the Writing Study

1984	Read Total	Read Voc	Read Comp	Lang Total	Lang Exp	Lang Mech	Unit	Total #
Male	593	586	598	605	601	608	1.5	526
Female	592	582	599	628	618	633	1.7	517
								1,043

1985	Read Total	Read Voc	Read Comp	Lang Total	Lang Exp	Lang Mech	Unit	Total #
Male	590	584	596	608	600	615	2.2	550
Female	598	586	607	638	625	648	2.4	562
Not Coded	580	583	575	612	615	601	2.1	8
								1,120

TABLE 2

Summary of Descriptive Data for Sixth Grade Students Involved in the Writing Study

1984	Read Total	Read Voc	Read Comp	Lang Total	Lang Exp	Lang Mech	Write	Total
Male	515	509	528	552	543	561	2.2	525
Female	526	514	542	575	565	586	2.5	540
								1,065

1985	Read Total	Read Voc	Read Comp	Lang Total	Lang Exp	Lang Mech	Write	Total
Male	510	504	523	553	547	565	2.0	533
Female	523	514	537	577	564	588	2.1	526
Not Coded	519	518	524	578	567	581	2.2	10
								1,069

TABLE 3

Summary of Correlation Coefficients for Ninth Grade Females Involved in the Writing Study

	READV	READC	READT	LANGE	LANGM	LANGT	WRITE
READV	.	.82	.94	.76	.66	.77	.41
READC		.	.96	.77	.64	.77	.39
READT			.	.80	.67	.81	.41
LANGE				.	.70	.95	.38
LANGM					.	.88	.13
LANGT						.	.39
WRITE							.

(1984)

	READV	READC	READT	LANGE	LANGM	LANGT	WRITE
READV	.	.80	.93	.72	.60	.72	.45
READC		.	.96	.75	.61	.75	.48
READT			.	.77	.63	.78	.49
LANGE				.	.69	.95	.49
LANGM					.	.88	.36
LANGT						.	.47
WRITE							.

(1985)

TABLE 4

Summary of Correlation Coefficients for Ninth Grade Males Involved in the Writing Study

	READV	READC	READT	LANGE	LANGM	LANGT	WRITE
READV	.	.81	.94	.77	.66	.79	.43
READC		.	.96	.77	.66	.79	.40
READT			.	.81	.69	.82	.44
LANGE				.	.69	.95	.43
LANGM					.	.88	.38
LANGT						.	.45
WRITE							.

(1984)

	READV	READC	READT	LANGE	LANGM	LANGT	WRITE
READV	.	.80	.93	.72	.60	.72	.45
READC		.	.96	.75	.61	.75	.48
READT			.	.77	.63	.78	.49
LANGE				.	.69	.95	.49
LANGM					.	.88	.36
LANGT						.	.47
WRITE							.

(1985)

TABLE 5

Summary of Correlation Coefficients for Sixth Grade Females Involved in the Writing Study

	READV	READC	READT	LANGE	LANGM	LANGT	WRITE
READV	.	.75	.92	.74	.60	.75	.47
READC		.	.95	.75	.58	.76	.50
READT			.	.79	.63	.80	.52
LANGE				.	.63	.94	.45
LANGM					.	.84	.45
LANGT						.	.49
WRITE							.

(1984)

	READV	READC	READT	LANGE	LANGM	LANGT	WRITE
READV	.	.75	.91	.69	.56	.69	.37
READC		.	.95	.75	.57	.73	.43
READT			.	.76	.60	.76	.43
LANGE				.	.68	.95	.43
LANGM					.	.86	.34
LANGT						.	.43
WRITE							.

(1985)

TABLE 6

Summary of Correlation Coefficients for Sixth Grade Males Involved in the Writing Study

	READV	READC	READT	LANGE	LANGM	LANGT	WRITE
READV	.	.78	.92	.75	.62	.76	.48
READC		.	.95	.77	.64	.78	.46
READT			.	.81	.66	.82	.50
LANGE				.	.66	.94	.48
LANGM					.	.87	.41
LANGT						.	.49
WRITE							.

(1984)

	READV	READC	READT	LANGE	LANGM	LANGT	WRITE
READV	.	.80	.93	.72	.60	.72	.45
READC		.	.96	.75	.61	.75	.48
READT			.	.77	.63	.78	.49
LANGE				.	.69	.95	.49
LANGM					.	.88	.36
LANGT						.	.47
WRITE							.

(1985)

TABLE 7

Multiple Correlation Coefficients Between Writing Achievement and CAT Subtests: Ninth Grade

CAT Subtests	MULTIPLE R	R^2	S.E.M.
LANGT	.51	.18096384	.00044
LANGT + READV	.533	.20174873	.00045
LANGT + READV + READC	.536	.20233472	.00040

(1984)

CAT Subtests	MULTIPLE R	R^2	S.E.M.
READT	.46	.28219692	.00044
READT + LANGT	.492	.30145242	.00053
READT + LANGT + LANGM	.494	.30349930	.00064

(1985)

TABLE 8

Multiple Correlation Coefficients Between Writing Achievement and CAT Subtests: Sixth Grade

CAT Subtests	MULTIPLE R	R^2	S.E.M.
READT	.43	.25923960	.0005
READT + LANGT	.4491	.28473682	.0006
READT + LANGT + LANGM	.4498	.28755586	.0007

(1984)

CAT Subtests	MULTIPLE R	R^2	S.E.M.
LANGE	.53	.21619573	.00054
LANGE + READC	.549	.24294860	.00055
LANGE + READC + READV	.550	.24460809	.00046

(1985)

RESEARCH QUESTION 1: What is the correlation between achievement on the CAT Reading and Language subtest scores on the North Carolina Writing Assessment?

Using the Statistical Analysis System (SAS) Correlation Procedure, the six subtests of the CAT were analyzed. Intercorrelations among the CAT subscales and the criterion appear in Tables 3, 4, 5 and 6. Multiple correlation coefficients and standard errors of measurement are presented in Tables 7 and 8. The R's ranged from .51 to .54 at the 9th grade level in 1984. The R's ranged from .46 to .49 at the 9th grade level in 1985. At the 6th grade levels, R's in 1984 range from .43 to .45 and from .53 to .55 in 1985.

RESEARCH QUESTION 2: What is the relationship between scores on the CAT subtests and achievement in writing?

Descriptive statistics, intercorrelations and multiple correlation coefficients between the variables are provided in Tables 1-8. At the ninth grade level, 20% of the variances in writing scores was accounted for by scores on the CAT Reading Vocabulary and Language Total subtests in 1984. In 1985, the CAT Reading Total and Language Total subtests accounted for 30% of the variance in writing assessment scores. The F values were found to be significant for ninth grade students in 1984 and 1985.

($F = 131.42$, $p < .0001$)
(1984)
($F = 240.58$, $p < .0001$)
(1985)

A summary of the regression analysis appears in Table 9 for ninth grade students. The regression equations are:

$Y = -0.87 + 0.002\ (READV) + 0.002\ (LANGT)$ (1984)
$Y + -1.08 + 0.003\ (READT) + 0.002\ (LANGT)$ (1985)

At the sixth grade level, 28% of the variance in writing assessment scores was accounted for by scores on the CAT Reading Total and Language Total subtests in 1984. In 1985, the CAT Language Expression and Reading Comprehension subtests accounted for 24% of the variance in writing scores. The F values were found to be significant for sixth grade students in 1984 and 1985.

($F = 211.38$, $p < .0001$)
(1984)
($F = 171.05$, $p < .0001$)
(1985)

A summary of the regression analysis for sixth grade appears in Table 10. The regression equations are:

$$Y = -1.00 + 0.003\ (READT) + 0.003\ (LANGT) \quad (1984)$$
$$Y = -1.17 + 0.003\ (READC) + 0.003\ (LANGT) \quad (1985)$$

The results of this study are discussed in the next section.

TABLE 9

Summary of Regression Analyses for Ninth Grade

Source	Sum of Squares	df	Mean Square	F
Regression	96.52	2	48.26	131.42*
Residual	381.88	1040	0.37	

* $p < .0001$

1984

Source	Sum of Squares	df	Mean Square	F
Regression	193.02	2	96.51	240.58*
Residual	447.28	1115	0.40	

* $p < .0001$

1985

TABLE 10

Summary of Regression Analyses for Sixth Grade

Source	Sum of Squares	df	Mean Square	F
Regression	160.05	2	80.03	211.38*
Residual	402.05	1062	0.38	

* $p < .0001$

1984

Source	Sum of Squares	df	Mean Square	F
Regression	141.33	2	70.66	171.05*
Residual	440.40	1066	0.41	

* $p < .0001$

1985

TABLE VI

Writing Domain Scores and Corresponding Mean CAT Scale Scores for Ninth Grade

WRITING SCORE	N	READV	READC	READT	LANGM	LANGE	LANGT
4	11	674	675	679	679	714	709
3.5	18	653	658	664	678	694	699
3	45	650	646	652	667	661	672
2.5	76	640	654	652	673	664	675
2	252	604	621	615	640	630	638
1.5	202	584	597	592	626	606	616
1	439	552	568	560	590	590	584
			1984				
4	53	664	688	683	701	699	715
3.5	60	634	664	653	686	670	686
3	265	618	634	629	662	645	658
2.5	134	592	616	605	641	620	632
2	424	569	585	577	619	598	607
1.5	76	544	550	546	581	567	571
1	108	524	530	524	566	543	548
			1985				

TABLE 12

Writing Domain Scores and Corresponding Mean CAT Scale Scores for Sixth Grade

WRITING SCORE	N	READV	READC	READT	LANGM	LANGE	LANGT
4	37	558	604	584	628	623	638
3.5	58	553	586	572	625	611	627
3	240	542	565	553	596	583	591
2.5	151	524	553	537	582	575	579
2	409	497	517	503	563	542	548
1.5	72	490	508	493	546	534	535
1	98	455	474	456	517	488	492
			1984				
4	17	579	602	595	616	625	634
3.5	31	562	593	579	620	614	628
3	164	536	564	550	602	592	602
2.5	150	531	555	541	593	583	591
2	359	508	527	513	579	556	565
1.5	138	494	511	497	560	534	542
1	207	472	488	473	542	507	516
			1985				

DISCUSSION

The results of this investigation provide us with some interesting information relative to patterns of performance and the relationship of the performance pattern to the prediction equation and the predictors of writing achievement. The regression equations are the same for the descriptive writing prompt administered to sixth grade students in 1984 and the point-of-view writing prompt administered to ninth grade students in 1985 (see Research Question 2 in the Results section of this study). The results of the writing assessment in 1984 were more positive for sixth graders than they were for ninth grade students (approximately 64% of the ninth grade students received a composing domain score of 2 or lower). The reverse took place in 1985 with ninth grade students performing better on the point-of-view prompt than did sixth grade students on the clarification prompt. Both persuasive and clarification writing are considered to be the more difficult composing domains assessed at their respective grades in the North Carolina Annual Writing Assessment program. Tables 11 and 12 highlights students' writing scores and their average performance on the CAT subtests in 1984 and 1985. Of particular note is the fact that for students in our sample of ninth graders, the average student in our sample that received a writing score of 2.5 received higher CAT subtest scores in Reading Comprehension, Language, Mechanics, Language Expression and Language Total than did students with writing scores of 3.0 (Table 11). In all cases, the data indicated that a bimodel distribution exists when you compare writing scores with the sample of students selected for this study (Tables 11 and 12). Further, it appears that when the bimodel distributions center around 2, 2.5 and 3 score points on the writing assessment at grades 6 and 9 in our study that the prediction equation is the same. The data provide preliminary support for the notion that the best predictors of scores on the annual writing assessment using the CAT test are the Reading Total and Language Total subtests. At the ninth grade level, 30% of the

variance in writing assessment was due to a combination of the CAT Reading Total and Language Total scores for students in the sample. At the sixth grade level, 28% of the variance in writing scores could be accounted for by Reading Total and Language Total scores. This notion needs to be investigated further. The MAXR statistical procedure yielded F values that were significant at the .0001 level at both grades in 1984 and 1985 in terms of the predictors of writing achievement. The years in which the predictors reflected a combination of variables other than Reading Total and Language Total scores (e.g., 9th graders in 1984 and 6th graders in 1985), the amount of variance accounted for was 20% at the ninth grade level and 24% at the sixth grade level.

The range of intercorrelations with writing assessment scores ranged from .33 (1984 Language Mechanics) for 9th grade females to .49 for 9th grade males and females on Language Total and Language Expression subtests (1985). For sixth graders, the intercorrelations ranged from .37 in 1985 for females on Reading Vocabulary to .52 for females on Reading Total in 1984.

In concluding, one should look at their study as providing additional information relative to the relationship of the North Carolina Writing Assessment to the largest segment of the annual testing program, the California Achievement Test. The low to moderate correlations between the writing assessment and the CAT provide support for the need of a separate measure of writing. The data also indicate that the predictors of writing performance using a standardized achievement measure may vary depending on the difficulty of the composing domain assessed, student preparation and the resulting distribution of scores. Recommended is a replication of this study using data from the 1986 testing program on a larger sample of students so that patterns could be further studied. The fact that local school personnel are <u>becoming</u> more comfortable with teaching writing and preparing their students to take the writing assessment as well as the development of better prompts should yield data that will enable a stable prediction pattern to be found.

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